1905MNRAS..65..704M

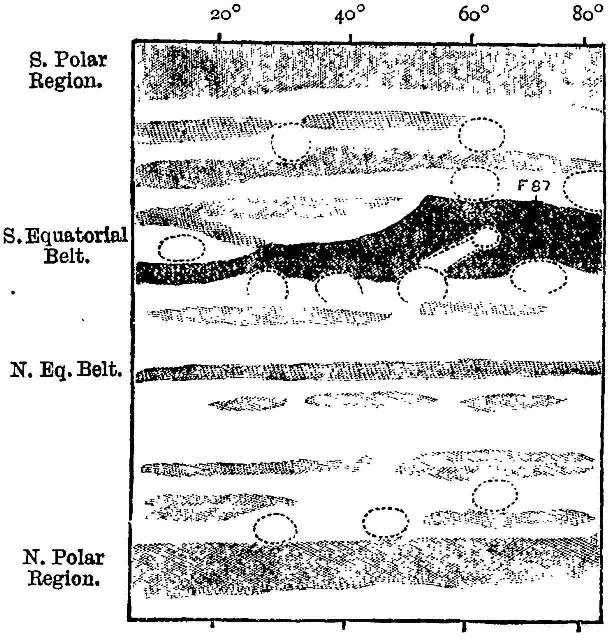
A Suspected Instance of Sudden Change on Jupiter.

By Major P. B. Molesworth, R.E.

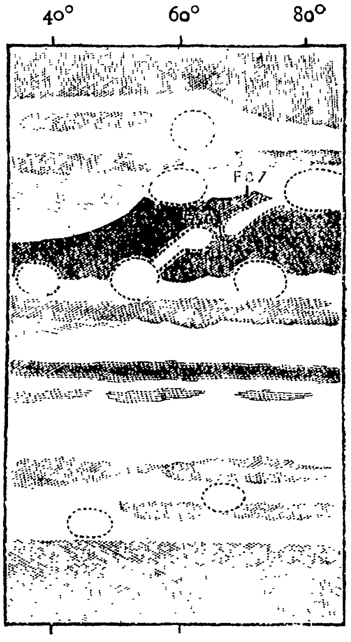
A most curious and unique observation was made here 1903 December 17.

I quote from the observing notes :—

> "The dark spot F87 (in the S. edge of S. equatorial belt) crossed the C.M. under almost perfect definition at $7^{\mathrm{h}}\ 10^{\mathrm{m}}{\cdot}5$ L.T. ($1^{\mathrm{h}}\ 45^{\mathrm{m}}{\cdot}5$ G.M.T.). The surroundings were carefully entered on the sketch (No. 128) and the neighbourhood presented the appearance shown there.
>
> "At $7^{\mathrm{h}}\ 25^{\mathrm{m}}$ L.T. (2^{h} G.M.T.) I suddenly noticed a minute bright white spot, like i just after ingress, on the S. edge of the S. equatorial belt immediately preceding F87. I thought it very strange that I should have omitted to take the transit of such a prominent spot or to show any indication of it on the sketch. At $7^{\mathrm{h}}\ 28^{\mathrm{m}}$ L.T. ($2^{\mathrm{h}}\ 03^{\mathrm{m}}$ G.M.T.) it was very evident, and could not have escaped the most casual scrutiny. Between $7^{\mathrm{h}}25^{\mathrm{m}}$ and $7^{\mathrm{h}}30^{\mathrm{m}}$ L.T. (2^{h}—$2^{\mathrm{h}}05^{\mathrm{m}}$ G.M.T.) its visibility fluctuated a good deal. This was not due to any fault in the definition, which was very sharp the whole time. By $7^{\mathrm{h}}\ 30^{\mathrm{m}}$ L.T. ($2^{\mathrm{h}}\ 05^{\mathrm{m}}$ G.M.T.) the bright spot had extended as a short bright rift for some distance into the belt, its north preceding end being only separated by a



No. 128.—Longitude (System ii.).
About 1·45 G.M.T.



No. 128 a.—Longitude (System ii.).
About 2·05 G.M.T.

1905MNRAS..65..704M

narrow streak from F83. This appearance was preserved unchanged as far as I could see till $7^{h}\ 50^{m}$ L.T. ($2^{h}\ 25^{m}$ G.M.T.), but the region was then so far from the C.M. as to make observation difficult. When the bright spot was first noticed, it was just *preceding*, and in contact with, F87; but the oblique rift later on appeared to enter the belt from a point immediately *following* F87.

"I am certain that there was no illusion in the question, and that the phenomenon was a case of actual rapid change on the surface of *Jupiter*. I have tried to represent the general appearance after the formation of the spot at $7^{h}\ 30^{m}$ L.T. ($2^{h}\ 5^{m}$ G.M.T.) in No. 128a, and the change can be easily seen by comparison with No. 128, which shows the same neighbourhood at about $7^{h}\ 10^{m}$ L.T. ($1^{h}\ 45^{m}$ G.M.T.)."

The telescope used was the $12\frac{3}{4}$ Calver reflector with a Steinheil monocentric eyepiece magnifying 270.

During a fairly large experience of work on *Jupiter* I have never seen anything in the remotest degree like the appearance recorded in this observation, and I am perfectly certain that there was no illusion.

The apparent change of position of the white spot with regard to the dark spot F87 is, I think, attributable to an actual motion of the white material diagonally across the belt; forcing back the dark edge of the belt in its onward progress, and curling it over so as to form a second and darker inflection of the S. edge of the belt just following F87, which was mistaken for F87, somewhat as shown in the three diagrammatic sketches (figs. 1 to 3). In these the arrow shows the direction of motion of the white material under this supposition. I have purposely exaggerated the size of the second inflection.

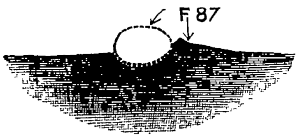


Fig. 1. About $2^{h}\ 00^{m}$.

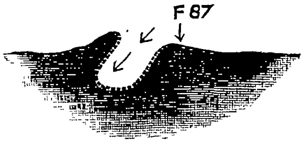


Fig. 2. About $2^{h}\ 03^{m}$.

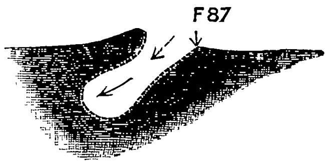


Fig. 3. $2^{h}\ 05^{m}$ and later.

It will be noticed that the outburst took place a short distance following the Red Spot bay in a latitude where rifts of this sort are practically unknown. I cannot recollect ever having seen a rift connecting the S. tropical zone with the central rift of the S. equatorial belt, but connections between the central rift and the S. edge of equatorial zone are very common. The outburst is therefore peculiar from its position as well as on account of its suddenness.

The same region was visible in twilight on 1903 December 20, but no signs of the formation could then be seen, nor was

1905MNRAS..65..704M

anything remarkable noticed in its position at any subsequent date. Its existence seems therefore to have been a very short one.

Of the two sketches forwarded, No. 128 is a portion of the ordinary eyepiece chart for the night's work. No. 128a is a copy of the sketch made after the appearance of the spot in the observing note-book, the neighbourhood being filled in from No. 128.

Trincomali, Ceylon:
1905 *April* 12.

Further Note on the Density and Prolateness of close Binary Stars. By Alex. W. Roberts, D.Sc.

In vol. lxiii. (p. 527) of the *Monthly Notices* I considered the problem of determining the orbital elements of a close binary system from the light-changes produced by the mutual eclipse of the component stars as they circled round one another.

It is indeed only from photometric observations that we may hope to determine what many would regard as two of the most important facts in cosmic physics, the density of structure and the prolateness of figure of two masses of matter revolving almost, or actually in contact, round their common centre of gravity.

Fortunately the difficulty of the problem, at least when considered generally, is not in any way a serious one. The problem consists, in its simplest form, in determining the area of the projected surface of two contiguous revolving masses. The light-changes of a close binary system are of course dependent on this ever-changing area. Given, therefore, a very accurately determined light-curve, we may readily ascertain the area included within the projected outline of the system; and this being known, it is but another step to the determination of the orbital elements, of figure, of position, of movement, which govern the form of the projected area.

This of course is only a general statement of the problem. A rigorous consideration of it is a more involved matter. We may indicate one or two of the difficulties that arise.

If the orbit of a close binary system be at all eccentric, and the density small, as is usually the case with stars of this class, then there will be a constant change of figure as the mutual attraction varies in intensity. To give a concrete example, the major axis of *β Lyræ* varies in length every revolution, through at least one million miles, and this contraction and expansion along the major axis, and commensurate expansion and contraction along the two axes at right angles to it, is a continuous movement. Further, the turning points of this oscillation do not coincide with the apsidal line, but are modified by the density